COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 45.

Some Harmful Household Insects.

By H. T. FERNALD, Ph. D.,
State Zoologist.

PUBLISHED BY DIRECTION OF THE SECRETARY.

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COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF AGRICULTURE,
DIVISION OF ZOOLOGY,
HARRISBURG, PA., *May 5, 1899.*

HON. JOHN HAMILTON, *Secretary of Agriculture:*

SIR: I have the honor to offer for publication the following article on Some Harmful Household Insects, as a response to many letters of inquiry received from all parts of the State. Invasions of our houses, stores, factories and other buildings by ants and roaches, and injury to woolen and other goods, either made up into clothing or while stored in the piece, are often very serious, and information how to best destroy these pests or hold them in check is in great demand.

Respectfully submitted,

H. T. FERNALD.
Economic Zoologist.

SOME HARMFUL HOUSEHOLD INSECTS.

Every housekeeper has much to contend with in the way of insect pests. At one time it may be clothing which is being eaten; at another, some insect may be at work in the pantries; or it may be that roaches are so abundant as to be a source of much discomfort, while other insects occasionally make their appearance and cause much inconvenience and even loss.

A few of the most common household pests are, therefore, considered here, together with the best methods by which they can be held in check or destroyed.

"CLOTHES MOTHS" IN GENERAL.

As generally used, this term is misleading, for in reality, not only are three true moths or "millers" concerned, but a beetle—the "Buffalo Bug"—is included, and in fact is the worst of the four, while a second beetle is often present to aid in the work.

THE BUFFALO BEETLE.

(*Anthrenus scrophulariæ* Linn.)

The Buffalo beetle, Buffalo bug, Buffalo moth or carpet beetle, as it is called in various portions of the country, is a native of Europe, from which country it reached the United States about the year

Fig. 16.—The Buffalo Beetle. A, Adult beetle; B, full-grown larva; both greatly enlarged.

1874. Why it should have received the name "Buffalo" is unknown, unless because of some fancied resemblance of the hairy, shaggy larva to a Buffalo.

Life History.

The adult carpet beetles generally appear in the fall and continue to appear at intervals during the winter, in houses where the temperature is high enough to permit of their following out their round of life. The eggs hatch soon after being laid, and the young larvæ feed on the wool, either of carpets or woolen clothing or other goods, and on furs, but do not touch cotton. They feed in this way and grow for a time, until full grown, having cast their skins about six times during this period. When full grown the larva is a little more than a quarter of an inch long, covered by tufts of hairs which give it a shaggy appearance. It now becomes a quiet pupa from which the adult beetle emerges after a short time. The beetle itself is rather less than a quarter of an inch long, and nearly as broad. Its color is blackish but mottled with white and with a red stripe along the middle of the back. It flies in the daytime and may often be found on the windows of houses.

The number of broods a year of this insect is dependent on conditions of temperature where it lives. It is probable, however, that there are at least two broods each year.

Injuries.

The damage caused by the carpet beetle is considerable. It works in concealed places, in portions of carpets rarely walked over, and from the under surface. It sometimes eats irregular holes, but more often follows along cracks in the floor, or along the edges close to the walls. In clothing it seems to prefer folds and concealed portions to work in. It is also a pest in collections of insects, birds, etc., feeding on them and causing much destruction, particularly in Europe, where is is more injurious in this way than in any other. It attacks silk and has recently been found in abundance feeding on the cocoons of silkworms.

Treatment.

This is an insect which it is difficult to control, and only the most vigorous measures, long continued, will prove successful. In the case of carpets, they should be taken up and beaten, and while out of doors should be sprayed with benzine, after which they should be allowed to air for two or three hours. During this time the rooms in which they go should be thoroughly swept and the floors washed with hot water. Treatment of the cracks and corners should be particularly thorough. Where the cracks are wide, they should be filled with plaster of Paris, and if a little kerosene be placed in the

smaller ones, it will destroy any of the beetles which may be concealed in them. Tarred paper, like that used for building purposes, placed under the carpets, is desirable, the insects seeming to dislike this. If this treatment be followed out twice each year, little trouble should be felt, in the carpets, though if only one such cleaning can be given, this would be most effective in midsummer. If, however, it is discovered that the carpets are infested at a time when this treatment cannot be carried out, a damp cloth can be laid over the places where the injury is taking place and a hot flat-iron passed over it. The steam thus formed, passing down through the carpet, will kill the insects there. In the case of woolen clothing where kept in closets, taking it out and brushing it, carefully followed by an airing out of doors for an hour or two, every week or two, will generally be sufficient. A little piece of woolen cloth placed loosely on the closet floor will serve as a trap and attract many insects which would otherwise attack the clothing hanging above. This cloth should be carefully taken up and shaken out of doors every week and then baked in a hot oven for a few minutes to destroy the insects which may be in it.

Before putting away woolen clothing and furs for the summer, they should be brushed and aired as described above. They should be then placed in boxes so tight that the beetles cannot enter, together with some camphor, though this is of little use against the carpet beetle but is objectionable to the clothes moths. Cold storage during the summer months is effective if no insects are in the goods at the time they are stored. If any are in the goods, however, they will resume their work as soon as removed from the storage house.

These methods of themselves indicate what a difficult insect this is to control.

THE BLACK CARPET BEETLE.

(*Attragenus piceus* Oliv.)

This insect, sometimes called the pitchy carpet beetle, is very similar to the Buffalo beetle in its habits. It is less abundant, however, and less injurious, not often cutting slits in the carpets.

It has been present in the United States for over forty years; is present over nearly all of Europe and Asia, from which it came to this country, and appears to be particularly partial to feathers.

The adult beetle is about the size of the Buffalo beetle, but is not as broad in proportion to its length, and is entirely black, with no white markings, and without the red stripe so noticeable in the other insect. The length of time to complete its life history appears to be much longer for this beetle than for the other—two years have been required for its round of changes, in confinement.

The larva occasionally feeds in flour and meal, as well as on feathers and woolens, and also figures to some extent as a museum pest. It is longer and more slender that the Buffalo beetle larva and has a long tuft of hairs extending backward from its hinder end. The treatment for it is the same as for the Buffalo beetle.

THE CLOTHES MOTHS.

There are three clothes moths, genrally confused by the housekeeper and regarded as the same. They are the case-making clothes moth (Tinea pellionella Linn.), the webbing clothes moth (Tinea biselliella Hum.), and the tapestry clothes moth (Trichophaga tapetzella Linn.). Of these, the latter is not at all common and injury caused is in most cases the result of the work of one or both of the other two.

The moths of all three kinds are small yellowish "millers" which fly about houses at night, not usually being attracted to light, but keeping away from it. In consequence those which gather around the light at night may in general be regarded as harmless so far as household goods are concerned. The moth itself does not feed, its mouthparts being rudimentary.

Life History.

There is probably but one brood of the case-making clothes moth a year in the North, though there may be two or even more in the South. The moths appear from June to August, or even as early as April in warmly heated houses, in which case two broods may be anticipated. The larva which does the injury is a little caterpillar which constructs about itself a movable case within which it crawls around. When this case becomes too small, the caterpillar cuts slits in it and inserts gores made of small particles of the food material, thus increasing its diameter until sufficiently large to provide the desired room. Upon becoming full grown the caterpillar goes into the quiet, pupa stage within the case, and about three weeks later, having completed its changes within, the adult moth appears.

The webbing clothes moth is more abundant in the South than the species just described, though both occur in Pennsylvania. There are two broods each year. The caterpillar does not form a case but spins a sort of silken net-work wherever it goes. When it has reached its full size it forms a cocoon of silk and particles of wool, quite irregular in outline, within which it transforms into the adult moth.

The caterpillar feeds not only on woolens, hair, feathers and furs, but also on collections of insects, and has been found injuring beef meal, and in England has been known to feed on cobwebs.

The tapestry moth is larger than either of the other clothes moths. Its caterpillar appears to prefer coarser and heavier goods than do those of the other clothes moths, and it is more often found in horse blankets, tapestries, felting, furs, skins and carriage upholsterings than elsewhere. The caterpillar mines in the substance it feeds upon, forming little galleries lined by silk, from which habit it is sometimes known as the gallery moth.

Treatment.

Treatment for the clothes moths is much the same as for the carpet beetle, and any methods which will exterminate this will destroy the clothes moths at the same time. Certain substances, however, are objectionable to the clothes moths which appear to have little or no effect on the beetles. Such are camphor, naphthaline balls (moth balls), tobacco and cedar. Where clothing, furs, etc., put away with either of these repellants are not already infested, the moths are not likely to lay their eggs on them, but if eggs or young are already present, the repellants will not prevent the young caterpillars from feeding and doing damage. Packing away in cedar chests is a good treatment so long as the odor of the cedar remains strong, but as it weakens, the protection it gives becomes less. Boxes lined with tarred paper are repellant to the moths.

Woolen goods and furs, before being put away for the summer, should be well brushed, aired and beaten, then wrapped in a linen cloth together with several moth balls, and the cloth pinned tightly over the bundle, leaving no direct opening to the goods by which the moths can enter. Several such bundles placed together in a trunk or tight box should be sufficiently well protected from moth attack.

With material which cannot be thus treated, such as carriage coverings, furniture covered with woolen cloth, etc., it is advisable to spray them every six weeks or two months from April to September with benzine through an atomizer. In doing this, danger of the benzine catching fire should be remembered and time and place chosen accordingly.

COCKROACHES.

These obnoxious insects are unfortunately far too abundant in this State. There are three kinds, one of which is found under sticks and stones and is native in this country, and as it is not known to enter houses, needs no further consideration here. The other two are the Oriental cockroach or black beetle (Periplaneta orientalis Linn.), and the German roach or croton bug (Ectobia germanica Fab.). Of these the former is much the larger, dark reddish brown in color

and glossy, while the later is much smaller and straw yellow. They are seldom or never found together, but have much the same habits, and are both European forms which have been introduced into this country.

Life History.

The roach, whichever kind be concerned, lays its eggs in little cases, each of which contains a considerable number. When completed this case is often carried about, partly within, partly outside the body of the parent for a considerable time, till the young hatch. The young, even when they first appear, so nearly resemble the adult that they are easily recognized as roaches, the most noticeable differences being the small size and the absence of wings in the young. As the little roaches feed and grow they cast their skins from time to time, usually repeating this six or seven times. Near the end of these changes the wings appear but in the case of the black beetle they never become as long as the body. The time required to complete this growth is a variable one, but is usually at least six months, and probably depends largely on conditions of food and temperature.

Injuries.

Roaches feed on food materials of almost every kind, on dead animal matter, and cereal products, and will gnaw leather bindings, probably for the paste on them.

Not only is much damage done by the consumption of these substances, but by their very presence, a "roachy" odor appears which is exceedingly disagreeable and difficult to remove. When it gets on food, it renders this uneatable, and dishes which are tainted by it, impart it to the food placed in them.

Treatment.

Of the two species under consideration, the croton bug is the more alert and wary and is much harder to destroy than the Oriental roach. They are quick to discover the presence of poison in food prepared for their benefit and to avoid it.

Cleanliness, and destruction by means of traps, by fumigation and by poisons are the methods available in the treatment of these insects.

Traps are sometimes quite successful in capturing roaches, the usual trap being a box so arranged that the insects enter, attracted by a bait, but cannot escape. In one trap the cover is replaced by four pieces of glass sloping to an opening in the center. The roaches enter, to feed on the bait placed within, and cannot escape. Occasionally the trap is placed in hot water to kill the insects. Another

trap is made by partially filling a deep jar with stale beer and inclining against the outside some sticks, the ends of which are bent downward to project into the jar a short distance. The roaches climb up the sticks and drop off their bent ends into the beer and are drowned.

Fumigation is only possible when the roaches are in rooms capable of being tightly closed as to be almost air-tight. Here, fumigation with carbon disulphide for twenty-four hours is usually quite effective, but the explosive nature of the gas must be remembered, and this method be not tried where heat of any kind is present. Burning insect powder in the place is a safer method, but it is difficult to get the fumes sufficiently dense, and the insect powder must be fresh and not adulterated if this treatment is to prove successful.

Poisons are usually avoided by roaches, but a phosphorus paste, sometimes also sold in the form of pills, is frequently a success. The

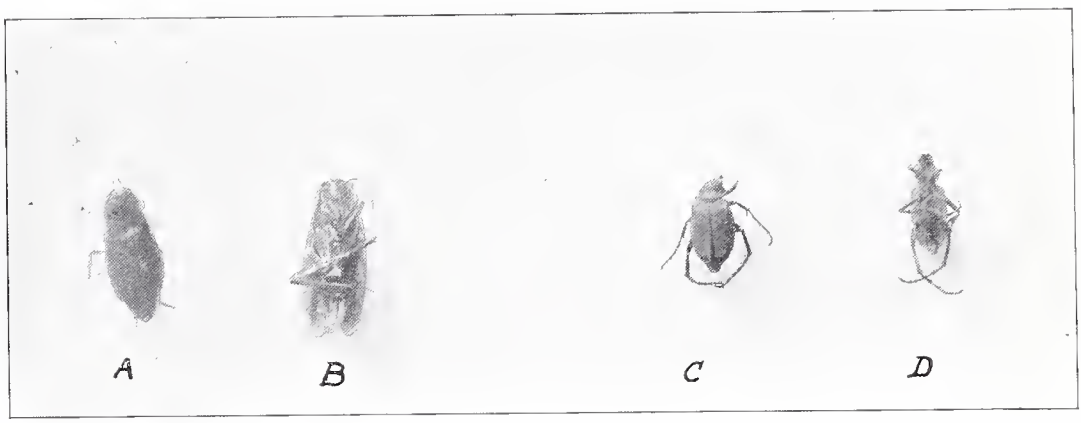


Fig. 17.—A, German Roach, upper surface; B, same, under surface; C, Rose Bug, upper surface; D, same, under surface; all slightly enlarged.

paste, spread on a piece of paper, is placed near where the roaches are abundant, at night, and the result is usually evident the next morning.

Powdered sugar and borax, mixed, is also sometimes successful, but is likely to be more effective against the Oriental roach than the more wary Croton bug.

One parasite of the roach is known in this country, but as it unfortunately has itself a parasite, it is less effective than would otherwise be the case.

ANTS.

Though the ants which infest houses generally do little actual damage, their presence is extremely annoying to every one. Two different kinds are usually concerned—the little red ant and the the little black ant (Monomorium pharaonis Linn. and Monomorium minutum Mayr.)—though occasionally a larger species is present.

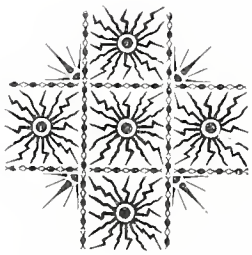
The centre of trouble in either case is the nest from which the different individuals come and to which they return. In this nest two kinds of ants are present. Most of the members of the colony are workers, while one or a few larger females or "queens" will be found. During the summer winged males and females are also produced, but these almost immediately leave the nest to start new colonies. The eggs are produced by the queens in enormous numbers and for the most part become workers.

Treatment.

From the foregoing it is evident that as long as females and even a few workers remain in the nest to produce new workers, the destruction of those outside can give but temporary relief. It follows that the first efforts should be towards the discovery and destruction of the nest with all its inhabitants.

The only method of locating the nest is that of watching the workers and tracing them back as they return from their foraging expeditions. This is often difficult, as the path may be through galleries in the floors or timbers of the house, but with patience the nest usually can be found. It is often located in walls, under floorings, in sills, or in similar places. Once found, if carbon disulphide or kerosene be injected into the nest through one or more of the openings by which the ants enter, destruction of the colony will follow if sufficient of either of these substances be used.

In the case of the little black ant and of the other larger kinds which sometimes occur, the nest is quite likely to be out of doors under some stone, or perhaps showing as a small ant hill. Here, too, treatment of the nest either by carbon disulphide or kerosene is effectual, the best method of using the carbon disulphide being to make one or more holes in the middle of the nest with a small stick and pour in each an ounce of the disulphide, and close up the holes at the top. Drenching the nests with boiling water is also usually successful.

If it should prove impossible to locate the nest, the only treatments which can be used are temporary. It is claimed that a heavy chalk line around any dish it is desired to protect will keep the ants away, but this is at best doubtful. Pieces of sponge soaked in sweetened water and placed on shelves troubled by ants will attract them in large numbers, and throwing the sponge into hot water several times a day when covered by ants will destroy many. A syrup made by dissolving equal parts of borax and sugar in boiling water has also been recommended as being very effectual in destroying ants; and other methods of treatment have appeared from time to time. Certain it is, however, that with queens left undisturbed in the

nests to produce multitudes of new workers to take the places of those destroyed, no permanent relief can be obtained in this way, and destruction of the queens in the nest is the only sure remedy.